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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/716,302	11/18/2003	Kenichi Kawase	112857-442	6931

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EXAMINER	
ALEJANDRO, RAYMOND	
ART UNIT	**PAPER NUMBER**
1745	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/31/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/716,302	KAWASE ET AL.	
	Examiner	Art Unit	
	Raymond Alejandro	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 January 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 September 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 01/02/07 has been entered.

This correspondence is in reply to the amendment accompanying the above-mentioned RCE. The rejections under Section 102 have been overcome. Refer to the abovementioned amendment for more details applicant's rebuttal arguments and remarks. However, the present claims are again rejected over a new ground of rejection as shown hereunder and for the reasons of record:

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuji et al 6432579 in view of Yamamoto et al 2003/0054249.

The present claims are directed to an anode and a battery wherein the disclosed inventive concept comprises the specific anode materials.

Concerning claims 1-3:

Tsuji et al disclose an anode for a secondary battery comprising a sintered material which contains silicon as an anode active material and a carbon material; and a base material (*the current collector*) made of a foil or mesh of conductive metal; wherein the sintered material is integrated with the base material and has a thickness in the range of 10-500 μm (See Claim 5 and 8). Tsuji et al disclose that the silicon containing material may be silicon oxide (COL 3, lines 53-60) and the thickness thereof ranging from 10-500 μm (COL 3, lines 21-25).

Specifically, Tsuji et al disclose a process for producing the anode comprising: preparing an active material containing a silicon-based anode material; coating a base material (*the current collector*) made of a metal foil/mesh with the silicon-based anode material to form a coated film; and sintering the coated film, thereby integrating a sintered material of the coated film with the base material (CLAIM 1). *Thus, the examiner strenuously contends that the part of the sintered material which is integrated with the base material (the current collector) represents the alloyed; and the part of the sintered material which is not integrated with the base material (the*

current collector) represents a first layer including silicon oxide provided over the alloyed portion.

Examiner's note: *applicant's specification in the paragraph bridging pages 5-6 states that "silicon...can be cited as a material which is easily alloyed" and that "silicon can form an alloy..." at page 6, lines 23-25. Therefore, it is further contended that the silicon material of Tsuji et al inherently alloy with the base material in the form of the metal foil.*

Concerning claims 4 and 9:

Tsuji et al disclose using an anode material in the form of a composite powder including carbon material and the silicon-containing material (COL 4, lines 5-10/ COL 3, lines 22-25).

Concerning claims 5 and 10:

Tsuji et al disclose that the silicon containing material may be silicon oxide (COL 3, lines 53-60).

Concerning claims 6-8:

Tsuji et al disclose the battery comprising the anode, the cathode and the electrolyte (CLAIM 6/ COL 5, lines 47-50/ EXAMPLE 1). ***Refer to the discussion of claims 1-3 supra*** for additional information concerning the specific anode comprising the current collector, the alloyed anode active material layer and the silicon-containing layer.

Concerning claim 11:

Tsuji et al reveals that the electrolyte includes a solid electrolyte containing a Li-ion conductive non-aqueous electrolyte by incorporating a Li-compound (the salt) into a polymer or retaining the organic solvent containing the Li-compound dissolved therein with the polymer (COL 3, lines 33-39).

Concerning claim 12:

Tsuji et al disclose an assembled battery (COL 5, line 48) including a battery can (COL 1, lines 29-30 and lines 38-39). *This can represents the exterior member(s) housing the cathode, the anode and the electrolyte.*

Concerning claim 13:

Tsuji et al disclose the use of lithiated metal complex oxides as cathode active materials (COL 5, lines 1-5).

Tsuji et al disclose an anode comprising a Si-based layer as described above. However, the preceding prior art reference fails to teach the second specific layer including Si-oxide.

As to claims 1-3:

Yamamoto et al exemplify in **EXAMPLE 9** a current collector 1d made of a copper foil, having an intermediate anode layer 7d consisting of Si-oxide films or a multi-layer film consisting of Si and its oxide films (P0130). *Thus, Yamamoto et al readily envisions an anode collector comprising a plurality of layers (at least two layers).*

Of particular interest is the fact that Yamamoto et al provides a structure comprising the third layer made of the oxide of a second-layer material on the second layer surface (P0062). Si and its oxides are particularly preferred (P0061, 0086-0087, 0100). Disclosed is that the thickness of the second anode layer is at least 0.1 μm (100 nm) (P0069, 0100). *The thickness of the second anode layer corresponds to the thickness of the Si-oxide layer.*

Additionally, Yamamoto et al disclose that both first and second layers may have either a single-layer structure or a laminated structure consisting of multiple layers. Although mutual positions between the first and the second layers are not particularly limited, either of these may

be on the electrode-surface side and any of the following structures may be employed: a) second layer on an electrode surface side in relation to the first layer; b) first layer on an electrode surface side in relation to the second layer; c) first layers disposed above and below the second layer; and d) second layers disposed above and below the first layer (P0052-0057). *Thus, Yamamoto et al discloses interchangeability of these layers, as well as feasibility in positioning them at any location.*

Examiner's note: *applicant's specification in the paragraph bridging pages 5-6 states that "silicon...can be cited as a material which is easily alloyed" and that "silicon can form an alloy..." at page 6, lines 23-25. Therefore, it is further contended that the silicon material of Yamamoto et al inherently alloy with the current collector in the form of the Cu-foil.*

As to the method limitation, i.e. the vapor phase, the liquid phase or sinter, it is noted that a method limitation incorporated into a product claim does not patentable distinguish the product because what is given patentably consideration is the product itself and not the manner in which the product was made. Therefore, the patentability of a product is independent of how it was made.

With the combination of the foregoing references at the time the invention was made, it would have been obvious to a person possessing a level of ordinary skill in the pertinent to coat the second specific layer including Si-oxide of Yamamoto et al in the anode of Tsuji et al as Yamamoto et al disclose that said second specific layer further improve a battery capacity while maintaining a higher charge discharge efficiency and good-cycle properties. *Moreover Yamamoto et al pertinent to the primary reference because Yamamoto et al discloses*

interchangeability of these layers, as well as feasibility in positioning them at any location within an electrode structure.

4. Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al 2003/0054249 in view of Tsuji et al 6432579.

As to claims 1-3:

Yamamoto et al exemplify in **EXAMPLE 9** a current collector 1d made of a copper foil, having an intermediate anode layer 7d consisting of Si-oxide films or a multi-layer film consisting of Si and its oxide films (P0130). *Thus, Yamamoto et al readily envisions an anode collector comprising a plurality of layers (at least two layers).*

Of particular interest is the fact that Yamamoto et al provides a structure comprising the third layer made of the oxide of a second-layer material on the second layer surface (P0062). Si and its oxides are particularly preferred (P0061, 0086-0087, 0100). Disclosed is that the thickness of the second anode layer is at least 0.1 μm (100 nm) (P0069, 0100). *The thickness of the second anode layer corresponds to the thickness of the Si-oxide layer.*

Additionally, Yamamoto et al disclose that both first and second layers may have either a single-layer structure or a laminated structure consisting of multiple layers. Although mutual positions between the first and the second layers are not particularly limited, either of these may be on the electrode-surface side and any of the following structures may be employed: a) second layer on an electrode surface side in relation to the first layer; b) first layer on an electrode surface side in relation to the second layer; c) first layers disposed above and below the second layer; and d) second layers disposed above and below the first layer (P0052-0057). *Thus,*

Yamamoto et al discloses interchangeability of these layers, as well as feasibility in positioning them at any location.

Examiner's note: *applicant's specification in the paragraph bridging pages 5-6 states that "silicon...can be cited as a material which is easily alloyed" and that "silicon can form an alloy..." at page 6, lines 23-25. Therefore, it is further contended that the silicon material of Yamamoto et al inherently alloy with the current collector in the form of the Cu-foil.*

As to the method limitation, i.e. the vapor phase, the liquid phase or sinter, it is noted that a method limitation incorporated into a product claim does not patentable distinguish the product because what is given patentably consideration is the product itself and not the manner in which the product was made. Therefore, the patentability of a product is independent of how it was made.

Concerning claims 4 and 9:

Example 9 shows the use of silicon-based materials and carbon materials as negative electrode active materials (EXAMPLE 9). *Thus, a simple substance and a Si-based compound.*

As to claims 5 and 10:

Yamamoto et al exemplify in **EXAMPLE 9** the use of Si-oxide films or a multi-layer film consisting of Si and its oxide films (P0130).

As to claims 6-8:

Yamamoto et al disclose the battery (TITLE/P0072) comprising the anode (CLAIM 1/P0067), the cathode (P0071) and the electrolyte (P0073). ***Refer to the discussion of claims 1-3 supra*** for additional information concerning the specific anode comprising the current collector, the alloyed anode active material layer and the silicon-containing layer.

As to claim 11:

Yamamoto et al disclose the use of a polymer electrolyte comprising a Li-salt and solvents (P0073).

As to claims 12:

Disclosed is the use of films as external members for housing the anode, the cathode and the electrolyte (P0072).

As to claim 13:

Yamamoto et al use Li-metal complex oxides as cathode active materials (P0071).

Yamamoto et al disclose an anode comprising a Si-based layer as described above. However, the preceding prior art reference fails to teach the first specific layer including Si-compound.

Tsuji et al disclose an anode for a secondary battery comprising a sintered material which contains silicon as an anode active material and a carbon material; and a base material (*the current collector*) made of a foil or mesh of conductive metal; wherein the sintered material is integrated with the base material and has a thickness in the range of 10-500 μm (See Claim 5 and 8). Tsuji et al disclose that the silicon containing material may be silicon oxide (COL 3, lines 53-60) and the thickness thereof ranging from 10-500 μm (COL 3, lines 21-25).

Specifically, Tsuji et al disclose a process for producing the anode comprising: preparing an active material containing a silicon-based anode material; coating a base material (*the current collector*) made of a metal foil/mesh with the silicon-based anode material to form a coated film; and sintering the coated film, thereby integrating a sintered material of the coated film with the base material (CLAIM 1). *Thus, the examiner strenuously contends that the part of the sintered*

material which is integrated with the base material (the current collector) represents the alloyed; and the part of the sintered material which is not integrated with the base material (the current collector) represents a first layer including silicon oxide provided over the alloyed portion.

In view of these teachings, it would have been obvious to a skilled artisan at the time the invention was made to employ the first specific layer including Si-compound of Tsuji et al in the anode of Yamamoto et al as Tsuji et al disclose that theirs first specific layer of a Si-compound contacting an anode current collector permits to increase the capacity per unit volume while reducing contact resistance between the current collector and the active layer (the Si-compound) in an anode which contains silicon as an active material

Response to Arguments

5. Applicant's arguments with respect to claims 1-13 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Raymond Alejandro
Primary Examiner
Art Unit 1745

RAYMOND ALEJANDRO
PRIMARY EXAMINER

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